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NORTH AMERICAN CRAMBUS (PYRALIDIDAE)
II. NEW SPECIES

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The present war has prevented the early completion of the writer's revision of the genus *Crambus*, since comparisons of specimens with the types at the British Museum cannot be made. Accordingly a number of short papers on the genus are being published. Of these, this is the second. The first was published in the Bulletin of the Southern California Academy of Sciences, XXXIX, pp. 53–70, January–April, 1940.

Crambus whitmerellus, new species

Figures 1, 2[2]

Crambus dumetellus FERNALD, 1896, The Crambidae of North America, pp. 33-34, Pl. III, fig. 2 (nec *Tinea dumetellus* HUEBNER, 1810–1813, Sammlung Europaischer Schmetterlinge, Pl. LVIII, figs. 389–390).

Crambus trichusalis FERNALD, *ibid.* (nec *Crambus trichusalis* HULST, 1886, Trans. Amer. Ent. Soc., XIII, p. 165).

Ever since it was first recorded from North America, this species has been considered the same as the European *dumetellus* Huebner. However, although nearly identical with *dumetellus* in color and pattern and closely related to it, it is specifically perfectly distinct, as comparison of the genitalia shows (Fig. 3.). It is even more closely related to *C. tutillus* McDunnough.

Study of a large series of specimens shows the existence of two subspecies, both of which are here named.

Crambus whitmerellus whitmerellus

Figure 1

FORE-WING.—Ground color yellowish brown to sooty yellowish brown. Costal edge narrowly pearly white for slightly less than half its length. A brown line inside this, parallel to costa, joining a diagonal brown line which slants from costa to outer margin below apex. A silvery white stripe along cell ending diagonally at the above mentioned diagonal brown line. Slightly beyond the middle of this stripe a strong dorsal tooth pointing to outer margin. Silvery white stripe narrowly margined with dark brown beyond this tooth, as also the outer edge of the tooth. Submarginal line bright, shining pearly white, oblique in its first third from costa, then angled at slightly more than 90° and running to dorsal margin, narrowly margined internally with brown. Between the submarginal line and the white cellular stripe, dorsal to the tip of the stripe, a trapezoidal white patch. Apex white, with a dark brown or fuscous triangle in the white area. White apical area bounded outwardly by a thin, dark brown or black line. Dorsal two-thirds of the terminal area, distad of the submarginal line, grayish white thickly dusted with brown scales; in this are five marginal black dots between the vein-ends. Five intervenular, narrow, shining pearly white lines, very narrowly margined with dark brown, extending from the cellular white stripe toward the submarginal line. The most dorsal of these is the longest. A pale shade running for most of the wing length along and above the dorsal margin. Fringes shining leaden, basally white in the apical area. Outer margin almost notched below the apex and somewhat convex below this.

Length of fore-wing 10.8–13.5 mm., averaging 12.2 mm.

HIND-WING.—Ground color light grayish brown, with a thin, dark brown marginal line. Fringes grayish white.

HEAD AND THORAX.—Palpi, face, vertex and dorsum of thorax yellowish brown. Tegulae the same, bronzy.

MALE GENITALIA.—Uncus broad and flat, rounded terminally, with a slight dorsal keel which ends in a small protruding spine. Gnathos rounded terminally and slightly longer than the uncus. Tegumen broad and well sclerotized. On the harpé: costa small; cucullus large, rounded terminally and thickly haired, with a small, internal, dorsal spine; sacculus large and heavily sclerotized, ending in a long projecting lobe which is sharp and hooked inward shortly at the tip. Aedeagus proportionately large and thick, with a small, heavily sclerotized, dorsal spine at the tip, and a single, large, curved, tapering cornutus.

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[2] All figures were drawn in outline with a camera lucida, and fine details added later. No consistent scale of magnification was used, since mere size is not an important criterion.

Genitalically, *whitmerellus* differs most strikingly from *dumetellus* in the structure of the harpé. The small spine on the cucullus of *whitmerellus* is absent in *dumetellus*, and the terminal part of the sacculus of *dumetellus* is produced as a long, slender, mesad curving arm.

TYPE MATERIAL.—*C. w. whitmerellus* is described from a type-lot of one hundred and six specimens. These are: holotype male, Capitol City, Hinsdale Co., Colo., 25–26 July, 1936 (Klots); allotype female, the same; paratypes as follows:

Montana: two, upper Gallatin Canyon, 7,000 ft., 1 Aug., 1928 (McDunnough).

Wyoming: six, Yellowstone Nat. Park, various localities, 4 July–2 Aug. (Braun, McDunnough); two, Paintbrush Canyon, Grand Teton Nat. Park, 28 July, 1934 (Braun); five, Green River Lake, Wind River Range, 7,858 ft. alt., 24 July–7 Aug., 1935 (Klots); three, New Fork Lake, Wind River Range, 7,800 ft. alt., 14 July, 1939 (Klots); two, vic. Green River Pass, Wind River Range, 10,000–10,500 ft. alt., 18–31 July, 1939, upper Canadian Zone meadow (Klots); one, Cody Road, Shoshone Nat. Forest, 6 Aug., 1934 (Braun); one, Shell Creek, Big Horn Mts., 15 July, 1896 (Currie); one, Medicine Bow Mts., 2 Aug., 1935 (Grace H. and John L. Sperry); two, Univ. of Wyoming Camp, Snowy Range, Albany Co., 17–23 July, 1935 (Klots).

Colorado: two, Hall Valley, Park Co., 10,000 ft. alt., 13–15 July, 1935 (Klots); one, Aspen, about 8,000 ft. alt., 24–27 July, 1919 (Lutz); two, Electra Lake, about 8,400 ft. alt., 28 June–1 July, 1919 (Lutz); nine, Summit Road, Ouray, about 10,000 ft., 13 July, 1919 (Lutz); twenty-six, Capitol City, Hinsdale Co., 9,700 ft. alt., 25-26 July, 1936 (Klots); nine, Silverton, 8–23 July, *ex* Barnes Coll. (U.S.N.M.); one, Yellow Mt., vic. Trout Lake, San Miguel Co., 11,500 ft. alt., 14 July, 1937, upper Canadian Zone meadow (Klots); twenty-five, Trout Lake, San Miguel Co., 9,500 ft. alt., 11–14 July, 1937 (Klots); one, La Plata Mts., Montezuma Co., 10,000–11,500 ft. alt., 24 July, 1937 (Klots).

Utah: one, "along road, Kamas, Summit Co. to Mirror Lake, Duchesne Co.," 9,500 ft. alt., 16 July, 1936 (Klots); one, Mirror Lake, Uinta Mts., 10,500 ft., Aug. (Richards); two, Geyser Pass, La Sal Mts., 10,000 ft. alt., 16 July, 1933 (Richards).

The holotype, allotype and a series of paratypes are in The American Museum of Natural History. Paratypes are in the following collections: British Museum, Canadian National Collection, McGill University, Museum of Comparative Zoölogy, Cornell University, Academy of Natural Sciences of Philadelphia, U. S. National Museum, Kansas State College, Colorado State College of Agriculture, Southern California Academy of Sciences, Annette Braun, John L. Sperry and the author.

In the writer's experience *w. whitmerellus* is one of the commonest and most widely distributed *Crambus* of the Rocky Mountain region. It appears to be limited to grassy meadows in the Canadian Life Zone areas, not normally occurring in either Transition or Hudsonian Zones. Its range, as far as is known, extends from Utah and southern Colorado (and doubtless northern New Mexico) north to Yellowstone Park, Wyoming. Northward of this it is replaced by *Crambus whitmerellus browni, vide infra.*

I name this species for my friend, the late Richard Whitmer of Albuquerque, New Mexico.

Crambus whitmerellus browni, new subspecies

Figure 2

The more northern population of *Crambus whitmerellus*, at least in the Rocky Mountain area, constitutes a subspecies distinct from the nymotypical one. From *C. w. whitmerellus* it is to be distinguished as follows:

FORE-WING.—The markings are as described above for *w. whitmerellus*. The ground color is, however, consistently lighter, and of a much more yellowish brown. In some cases it is almost light enough to be termed yellow-orange.

Length of fore-wing 9.9–13.1 mm., averaging 10.5 mm.

HIND-WING.—The ground color is a lighter, more yellowish brown than in *w. whitmerellus*.

HEAD AND THORAX.—Palpi, face, vertex and dorsum of thorax light yellowish brown. Tegulae the same, bronzy.

MALE GENITALIA.—The small spine on the inner surface of the sacculus averages much closer to the dorso-basal angle of the harpé than in *w. whitmerellus*.

As a subspecies of *whitmerellus*, *browni* presents two major points of interest. Firstly, its range overlaps that of *tutillus* McDunnough which, as noted previously, is the closest relative of *whitmerellus* in North America. This would seem to indicate that *tutillus* and *whitmerellus*, obviously distinct species, have arisen from a common ancestor. The southern subspecies of *whitmerellus*, the nymotypical one, is more similar to *tutillus* in that both possess a darker ground color, but in genitalia *tutillus* and *w. browni* are extremely close, more so than *tutillus* and *w. whitmerellus*. The genitalia would seem, in this case, to present better evidence of relationship than the color.

Secondly, it is unusual to find a genitalic difference between what are obviously to be considered merely subspecies. At first the author mistrusted this but after having made a considerable number of genitalic preparations of the two forms has now no hesitation in describing it.

Tutillus may be distinguished from *whitmerellus* as follows:

MALE GENITALIA.—In *tutillus* the gnathos is swollen and more or less spherical at its tip; the cucullus is broader; the small, more dorsal spine of the sacculus is in most specimens very short or rudimentary; the cornutus is longer than the width of the aedeagus.

COLOR AND PATTERN.—In fundamental pattern there is little difference between the two species. The ground color of the fore-wing of *tutillus* is a dark brown, much darker and richer than that of either *w. whitmerellus* or *w. browni*. The white markings are all more restricted in *tutillus*.

SIZE.—*Tutillus* is smaller than *whitmerellus*, the average length of fore-wing being 10 mm.

This subspecies is dedicated to Mr. F. Martin Brown of Colorado Springs, Colorado, who is doing so much to advance our knowledge of Rocky Mountain Lepidoptera.

TYPE MATERIAL.—*Crambus whitmerellus browni* is described from a type-lot of seventeen specimens. These are: holotype male, Waterton Lakes, Alta., 19 July, 1923 (J. McDunnough); sixteen paratypes as follows:

Alberta: three, Waterton Lakes, 19 and 27 July, 1923 (McDunnough); four, Nordegg, 13–21 July, 1923 (McDunnough).

Montana: nine, Glacier Nat. Park, 15–31 July (Braun, U.S.N.M., *ex* Barnes Coll.).

Holotype in Canadian National Collection. Paratypes in Canadian National Collection, The American Museum of Natural History, U. S. National Museum and the collections of Annette Braun and the author.

The author also has available for study a number of specimens of *whitmerellus* from Quebec. These do not agree very well with the Alberta and Montana specimens and are therefore not included in *browni*. They are characterized, in general, by a rather small size, a darker ground color, much like that of *w. whitmerellus*, and a tendency toward a blurring of the dark markings. They come from the following localities in Quebec: Bradore Bay, Kazubazua, Nominingue; Gaspé Nat. Park, Manche d'Epée and 40 miles north of Grand Cascapedia (all Gaspé); Godbout.

Crambus sargentellus, new species

Figure 5

A considerable series of specimens from Arizona and New Mexico, nearly all collected by Grace H. and John L. Sperry, prove to be a most distinct and apparently undescribed species of *Crambus*.

FORE-WING.—Ground color pale brownish yellow, lighter toward inner margin. Costal edge very narrowly dark brown, to about two-thirds, this ending in a transverse line of the ground color just inside the beginning of the submarginal line. Inside this costal line a narrow, pearly white streak. Inside this a broader streak of the ground color, margined basally toward the costa, and terminally along its inner side, with very narrow, dark brown lines. Inside this the longitudinal silvery white cellular stripe that characterizes so many *Crambus;* this is here rather narrow and acutely pointed and ends well short of the submarginal

transverse line. Except for a short basal portion toward the costa and a small portion inwardly just short of the tip, this stripe is narrowly but distinctly margined with dark brown.

Narrow silvery white stripes extending outward below veins R_{3+4}, R_5, M_2, M_3, Cu_1, Cu_2 and 2d A; these are distinctly, though narrowly, margined with dark brown. They reach, or nearly reach, the transverse submarginal line. The subterminal line begins diagonally on costa, runs toward the outer margin with a slight inward curve, then below the apex forms an angle of slightly more than 90° and runs to the inner margin, again with a slight inward curve. Apical area white, containing a large dark triangle of the ground color dusted with fuscous scales. Between the submarginal line and the outer margin is a dark, fuscous-dusted shade immediately below the apical area and beyond the end of the discal stripe; below this a small whitish area; and from this to the inner margin the space is dusted with fuscous scales which sometimes form very indistinct intervenular lines. Outer margin of the wing narrowly blackish.

Fringes white basally, yellowish outwardly, and semi-lustrous. Apex acute. Outer margin bending slightly outward below the apex, then basad to form a very retreating, rounded inner angle.

Length of fore-wing 13–17.3 mm., averaging 15.7 mm.

Hind-wing.—Ground color pale, grayish brown, rather thinly scaled. A slight terminal line of darker brown below the apex. Fringes grayish white.

Head and Thorax.—Palpi, face, vertex, dorsum of thorax and tegulae light brownish yellow.

Male Genitalia.—Uncus long, slender, rounded at end, bearing only slender hairs. Gnathos very weak. Tegumen deeply notched cephalad. Harpé with the costa large, heavily sclerotized, forming a strong, mesad curving lobe which abruptly narrows to a sharp slender spine at its tip. Cucullus lightly sclerotized, rounded, its dorsal margin shorter than its ventral, and thickly haired. Ventrally and inwardly, at the jointure of the cucullus and the sacculus, a heavily sclerotized ridge. Sacculus not heavily sclerotized, bearing no free spines. Aedeagus relatively short, terminating in a narrow, downward hooked lobe, and bearing a single large, curved, pointed cornutus, broad at its base.

Type Material.—*C. sargentellus* is described from a type-lot of fifty-eight specimens. These are: holotype male, Colter's Ranch, White Mts., Ariz., 18 June, 1937 (Grace H. and John L. Sperry); fifty-seven paratypes as follows:

Arizona: thirty-nine, Colter's (or Coulter's) Ranch, White Mts., 15 and 16 June, 1936, and 17 and 18 June, 1937 (Sperry and Sperry); ten, Alpine, 15–17 June, 1937 (Sperry and Sperry); three, Wildcat Cr., White Mts., 11 and 12 June, 1937 (Sperry and Sperry); two, White Mts., 26 June, 1935 (Sperry and Sperry).

New Mexico: two, 16 miles east of Taos, 30 June, 1935 (Sperry and Sperry); one, Panchuela Ranger Sta., Cowles, 6 June, 1941 (Klots).

Holotype and a series of paratypes in The American Museum of Natural History. Paratypes in British Museum, Canadian National Collection, Museum of Comparative Zoölogy, Cornell University, Academy of Natural Sciences of Philadelphia, U. S. National Museum, Kansas State College, Colorado State College of Agriculture, University of Arizona, Southern California Academy of Sciences, Annette Braun, John L. Sperry and the author.

Mr. Sperry writes me that this species does not come to light readily. The majority of the specimens were taken with nets between sunset and dark over the meadows and bunch grass. They were found alighted on the fruiting heads of grass, or flying over the meadows. After dark still more were taken in the same way with the aid of a lantern and a net.

Sargentellus is named for Dr. William D. Sargent of the College of the City of New York. May his falcons never learn to carry!

Crambus watsonellus, new species

Figure 4

Fore-wing.—Ground color light golden brown, with a satiny luster, paler dorsally. Silvery white discal stripe very broad, separated from costa along its basal half by only a narrow, dark brown line, then diverging. A dorsal tooth, sometimes small, from the stripe beyond its middle. About one-fifth of its length from its tip, the silvery white stripe narrows abruptly, being somewhat concave toward the costa, and terminates in a very slender, acute point. Costad of the tip of the stripe a strong, spindle-shaped, silvery white dash. Both this dash and the large stripe narrowly outlined with darker brown scales. Dorsad of the tip of the stripe a number of intervenular dark brown lines which may extend nearly to the submarginal line. Submarginal line beginning on the costa at a very acute angle, running toward the outer margin below the apex, then curving dorsad,

forming a rounded angle of slightly less than 90° and running to the inner margin diverging from the outer margin. Submarginal line of shining, semi-metallic scales, very narrowly margined internally with dark brown. Apical area yellowish white and containing a slender, triangular, dark brown spot. Below this the space between the submarginal line and the outer margin is light yellowish brown, lighter than the ground color of the wing, and somewhat powdery, and contains five short, black, intervenular dashes. Outer margin narrowly dark brown, darkest below the apex. Fringe with a satiny luster, yellowish white with dark brown termination.

Length of fore-wing 9.8–13.5 mm., averaging 12 mm.

HIND-WING.—Ground color very pale brownish tinged white, somewhat darker subapically. Fringe much lighter than the ground color, almost white, semi-lustrous.

HEAD AND THORAX.—Outer surfaces of labial palpi brown, slightly bronzy, the tips dark brown. Maxillary palpi, vertex and collar light brown. Tegulae darker brown, bronzy.

MALE GENITALIA.—Uncus very short and slender, bearing a number of slender hairs. Gnathos more than twice as long as the uncus, and very broad. Tegumen very slender. Vinculum broad, with a median, U-shaped, cephalad notch. Costa of the harpé apparently very complex, consisting of three main elements; the most basal and mesal is a strong, slightly sigmoid, heavily sclerotized spine, from the base of which a short rounded lobe projects in some specimens; the next, strongly sigmoid and free only at its abruptly mesad curved tip, terminates in a number of short slender teeth; the third, which is attached just below the dorsal margin of the harpé for most of its length, terminates in a broad, free, heavily sclerotized process which typically bears three slender points, the inner one the longest. Cucullus lightly sclerotized, ending abruptly in a slender, rounded, dorsally inclined process. I cannot identify a sacculus with assurance; possibly the structure referred to as the first element of the costa, or both the first and the second, represents the sacculus which would, therefore, have moved more further dorsad on the harpé than is normal. Aedeagus slender and short, its basal part curved ventrad, and slightly sclerotized. No cornuti.

TYPE MATERIAL.—*Crambus watsonellus* is described from a type-lot of seventy-two specimens. These are: holotype male and allotype female, Bar Harbor, Maine, 30 August, 1937 (A. E. Brower). Seventy paratypes as follows:

Maine: twenty-nine, Tremont, 18 Aug., 1940 (Brower); twenty-two, Bar Harbor, various dates, 12 Aug.–2 Sept. (Brower); one, Southwest Harbor, 12 Aug., 1938 (Brower); one, Southwest Harbor Bog, 26 Aug., 1936 (Brower); one, Mt. Desert I., 12 Aug., 1934 (Brower); one, Pretty Marsh, 18 Aug., 1940 (Brower).

New York: two, "New York," No. 14294, Coll. Henry Edwards.

New Jersey: two, Shark River, Coll. Henry Edwards; one, Jamesburg, 30 Aug., 1902 (Frank E. Watson).

Florida: nine, Pensacola, 11–14 October, 1914 (Watson).

Ohio: two, Clermont Co., 27 Aug., 1913 (Annette Braun).

The holotype, allotype and a series of paratypes are in The American Museum of Natural History. Paratypes are in the following collections: British Museum, Canadian National Collection, McGill University, Museum of Comparative Zoölogy, Cornell University, Academy of Natural Sciences of Philadelphia, U. S. National Museum, Kansas State College, Colorado State College of Agriculture, Southern California Academy of Sciences, Annette Braun, Dr. A. E. Brower and the author.

Although a widespread and locally common species, *watsonellus* has hitherto escaped notice because of its resemblance to the very abundant *Crambus leachellus* Zincken. From *leachellus*, *watsonellus* may be distinguished most certainly by the structure of the genitalia (cf. Klots, 1940, Bull. S. Calif. Acad. Sci., XXXIX, Pl. VI, fig. 2), but the lighter ground color of the fore-wing, the broader silvery white stripe and the characteristic shape of the terminal part of this stripe in *watsonellus* are also good diagnostic characters.

Dr. Brower, who has most generously sent to the author the fine series of this species which he has taken in Maine, contributes a note on its habitat. The series collected by him at Tremont, Maine, were taken in a marsh, near a small tidal creek. They were definitely not in an acid bog, the habitat to which so many *Crambus* are limited.

This species is dedicated to my friend and mentor in entomology, Frank E. Watson, recently retired from the American Museum. The unfailing kindliness and helpfulness which Mr. Watson has

shown to a great many students will always be remembered by them with gratitude.

Crambus ainslieellus, new species

Figure 6

FORE-WING.—Ground color yellowish brown, sometimes quite dark, sometimes with a distinctly bronzy iridescence. Discal silvery white stripe broad, only narrowly separated from costa and nearly reaching the submarginal line, tapering to a sharp point. Between the terminal, tapering portion of this stripe and the costa, below vein R_5, there is a small, spindle-shaped white dash. In some specimens this dash is very small; in others it is large and sometimes is joined to the large stripe. A few indistinct, intervenular, dark lines between the dorsal edge of the discal stripe and the submarginal line. Basad of the origin of the submarginal line on costa is a well-defined, diagonal, white streak. The submarginal line runs toward the outer margin, curving slightly inwardly, then curves to form a rounded angle of approximately 90° and runs to the dorsal margin. Apical area white, containing a narrow, dark brown, triangular patch that connects basally with a curved dark line that runs to costa distad of the submarginal line. Area below apical area and between submarginal line and outer margin very powdery looking, usually slightly more grayish than the ground color of the wing. In this area are four (very rarely five) narrow, intervenular, black dashes. A narrow, darker brown, marginal line, most distinct below the apex. Fringe semi-lustrous, brownish, lighter basally.

Length of fore-wing 9.4–13.2 mm., averaging 12 mm.

HIND-WING.—Ground color very pale brownish, very slightly darker apically and terminally. Fringes dirty white.

HEAD AND THORAX.—Labial palpi yellowish brown to brown, slightly bronzy. Vertex and collar lighter yellowish brown. Dorsum of thorax darker brown, bronzy.

MALE GENITALIA.—Uncus heavy and stout and considerably flattened, shorter than the gnathos, and bearing a dorsal series of strong curved spines on slightly less than its terminal half. Gnathos long and slender, somewhat spatulate at tip. Tegumen slender. Costa of the harpé very long and heavily sclerotized, curved mesad and tapering gradually to a sharp point. Cucullus broad basally, tapering to a slender rounded tip, a definite mesal ridge along its terminal three-fourths, thickly covered with slender hairs ventrad of this ridge. No internal spines or lobes on the cucullus, nor any evidence of a specialized sacculus. Vinculum broad, with a shallow, mesal, U-shaped notch. Aedeagus slightly shorter than the harpé, basally heavy, tapering considerably, projecting little basad of the ductus seminalis and bearing a single large curved cornutus.

TYPE MATERIAL.—*Crambus ainslieellus* is described from a type-lot of thirty-eight specimens. These are: holotype male, Logan Hill, Chehalis, Wash., 11 Sept., 1929 (J. F. G. Clarke); allotype female, same date and locality (T. C. Clarke); paratypes as follows:

North America: one, labeled "North America, Packard," "*Crambus leachellus* var. *pulchellus* Z., Meske 11 76" *ex* Zeller Coll., British Museum.

British Columbia: one, Kaslo, *ex* Barnes Coll. (U.S.N.M.).

Manitoba: eight, Aweme, 20, 21, 22 Aug. (N. Criddle); eleven, Cartwright, various dates, 21 Aug.–16 Sept. (J. F. Heath).

Washington: seven, labeled "Wsht. terr. 81" *ex* Zeller Coll. (British Museum); one, Logan Hill, Chehalis, 21 Oct., 1929 (T. C. Clarke).

Montana: one, Bozeman, 3 Sept., 1912.

South Dakota: one, Volga (Truman).

Iowa: three, Ames, 16 and 17 Sept., 1930 (G. C. Decker).

Maine: one, Lincoln, 4 Sept., 1933 (A. E. Brower); one, Bar Harbor, 17 Sept., 1938 (Brower).

Holotype, allotype and a series of paratypes in the U. S. National Museum; paratypes in the Canadian National Collection, The American Museum of Natural History and the collections of Dr. A. E. Brower and the author.

Ainslieellus is another of the species of North American *Crambus* that are, in color and pattern, nearly indistinguishable from *leachellus* Zincken. Genitalically it is absolutely distinct. A key for separating these species is given below, under *Crambus cyrilellus*, new species.

This species is named for the late George G. Ainslie of the U. S. Department of Agriculture who, at the time of his death, had done a great deal of valuable research on *Crambus*, most of it unpublished.

Crambus cyrilellus, new species

Figure 7

Like the preceding species, *watsonellus* and *ainslieellus*, this species has been confused with *C. leachellus* Zincken, to which it is very similar in color and pattern. A

key is given below for the differentiation of these from *leachellus* and other similar species.

FORE-WING.—Ground color light, shining orange brown, darkest about the discal, silvery white stripe, much paler and almost whitish along inner margin. Costal edge very narrowly white. Silvery white, discal stripe broad, separated from costa by a dark stripe much narrower than itself, with a slight dorsal tooth beyond middle, tapering symmetrically to a sharp point just before submarginal line. Short, sometimes more or less indistinct, intervenular, semi-metallic lines below veins R_5, M_2, M_3 and Cu_1 running from near the discal stripe nearly to the submarginal line. Sometimes these short lines are dusted also with dark brown scales. Submarginal line preceded on costa by a short, oblique, white line. Submarginal line running from costa toward outer margin below apex, there gently curved (forming an arc of about 100°) and running to inner margin, consisting of an inner, brown, and an outer, semi-metallic, line. Apical area white, with a narrow, orange brown, triangular dash. Submarginal area below this, white opposite end of discal stripe, below that (to inner margin) powdery gray brown. In this submarginal area are fine, thin, intervenular, submarginal, black lines, the one nearest the inner margin the shortest. A thin dark brown marginal line. Fringes shining, almost semi-metallic, whitish basally, darker gray brown distally.

Length of fore-wing 9.5–11 mm., averaging 10.5 mm.

HIND-WING.—Very pale brownish, almost white. Fringes white.

HEAD AND THORAX.—Head and palpi shining gray brown, slightly lustrous. Dorsum of prothorax the same. Tegulae darker.

MALE GENITALIA.—Uncus heavy and club-shaped, somewhat flattened, bent ventrally, with a large number of strong, short, basad pointing spines. Gnathos longer than uncus, slender, somewhat flattened. Tegumen narrow. Harpé with costa narrowly but heavily sclerotized, terminating in a long free arm, about two-fifths of total length of costa, that is very strongly curved mesad, broadest just before the tip, and pointed. Cucullus long and slender, somewhat curved dorsad. Sacculus with a strong, mesad pointing, free lobe. Vinculum broad, narrowly notched cephalad. Saccus slender. Aedeagus longer than vinculum plus harpé, with a short dorsal hook at base, a rounded, dorsal, hairy lobe near tip, and two long slender cornuti.

TYPE MATERIAL.—*Crambus cyrilellus* is described from a type-lot of seventeen specimens. These are: holotype male and allotype female, Fort Wingate, N. Mex., 16–23 July (holotype) and 16–23 June (allotype) (Barnes Coll.); fifteen paratypes as follows:

New Mexico: Fort Wingate, one male (24–30 June) and two females (1–7 July) (Barnes Coll.); one male, Viveash Ranch, 9,000 ft., 20 July (Cockerell); one female, Jemez Mts., 6,400 ft., 14 July, 1917 (J. Woodgate).

Arizona: Huachuca Mts., three males and three females with no date, and one female, 16–23 June (Barnes Coll.); one male, Santa Rita Mts., 6 July, 1898 (E. A. Schwarz); one male, Palmerlee (Barnes Coll.); one female, Alpine, 19 June, 1936 (Grace H. and John L. Sperry).

Holotype, allotype and a series of paratypes in the U. S. National Museum; paratypes in The American Museum of Natural History, the Academy of Natural Sciences of Philadelphia, the Southern California Academy of Sciences and the author's collection.

Another silvery striped species from Arizona, nearly identical in color and pattern with *cyrilellus* but distinct genitalically, is known to the author. Not enough material is available, however, to warrant description at present.

This species is named for Mr. Cyril dos Passos of Mendham, New Jersey.

The key that follows is intended to point out the most outstanding differences in genitalia between *Crambus leachellus* Zincken, *ainslieellus*, new species, and *cyrilellus*, new species. In color and pattern these are practically indistinguishable, especially *leachellus* and *ainslieellus*. *Cyrilellus* can usually be distinguished by the pale shade along the inner margin and the more distinct short semi-metallic intervenular lines.

MALE GENITALIA

1.—Harpé with no free lobe arising from sacculus; uncus very stout; aedeagus with a rounded hairy dorsal projection and with two cornuti.....*cyrilellus*.

1.—Harpé with a free lobe or spine arising from sacculus; uncus more slender; aedeagus with no dorsal projections and with only one cornutus.....2.

2.—Uncus very long and slender, about 9 times as long as deep; tegumen about 2.5 times as high as wide; harpé with cucullus very wide basally; saccus as

long as anterior-posterior width of vinculum; aedeagus with a very long, spirally coiled portion basad of attachment of ductus seminalis, the whole organ much longer than vinculum plus harpé..... *leachellus.*

2.—Uncus shorter and heavier, no more than 5 times as long as deep; tegumen (from side view) about 5 times as high as wide; saccus much shorter than anterior-posterior width of vinculum; aedeagus little longer than harpé, with very little extension basad of attachment of ductus seminalis..... *ainslieellus.*

Crambus sanfordellus, new species

Figure 8

Fore-wing.—Ground color bright orange brown, much less lustrous than is usual in this group of *Crambus*, darkest between discal stripe and costa, and dorsad of discal stripe. Silvery white discal stripe broad, narrowly separated from costa, tapering gradually to a sharp point just before submarginal line, with a very long and slender dorsal tooth from beyond middle. Inner margin narrowly but distinctly white from base. Submarginal line preceded on costa by a trapezoidal white patch. A series of fine, not very distinct, semi-metallic lines between veins, extending outward from discal stripe toward submarginal line. Submarginal line triple as it leaves costa, a narrow, silvery white line between two dark brown lines, running to below apex; there it bends, forming a rounded angle of slightly more than 90°, and, merely double and consisting of an inner, dark, and an outer, semi-metallic, line, runs to the inner margin. Apical area white, containing a dark brown, slender, triangular dash. Submarginal space below apex powdery gray-brown, with five indistinct, slender, black, intervenular lines, each more or less margined by a few white scales. Marginal line dark brown, narrow, most distinct below apex, less distinct toward inner margin. Fringes brownish, semi-satiny, white basally in apical region.

Length of fore-wing 11.6 mm.

Hind-wing.—Light brownish, whitish toward anal region; fringes white.

Head and Thorax.—Face and dorsum of head white; dorsum of thorax white, tegulae brassy lustrous, brown.

Male Genitalia.—Uncus slender, tapering to a rounded point, slightly flattened, about two-thirds as long as gnathos, bearing only short hairs. Gnathos long, slender. Tegumen long and narrow. Harpé with costa long and heavily sclerotized, ending in a long free lobe which is bent mesad at a right angle and tapers to a blunt point. Cucullus tapering and bent dorsad to a slender rounded tip. Sacculus strongly sclerotized but with no free lobes or spines. Vinculum broadly notched cephalo-ventrally. Saccus slender, short. Aedeagus slender, shorter than harpé plus vinculum, tapering to a heavily sclerotized, dextrally and dorsally bent spine, with a single long slender tapering cornutus.

Type Material.—*Crambus sanfordellus* is described from a single holotype male, Port Sewall, Fla., 26 Nov., 1938 (F. E. Watson and L. J. Sanford), Acc. 36406, in The American Museum of Natural History.

In color and pattern *sanfordellus* may be distinguished from other "silvery striped" *Crambus* by the broad silvery stripe with its very long slender, dorsal tooth, and by the narrowly white inner margin. Genitalically it is distinct from all other species in practically all structures.

The species is named for one of the collectors, Mr. L. J. Sanford, of The American Museum of Natural History.

Crambus johnsoni, new species

Figure 9

A distinct species, both in color and pattern and structurally, *johnsoni* appears to be limited to the Southwest.

Fore-wing.—Ground color greenish-brassy brown, paler toward the inner margin. Costal edge extremely narrowly white; inside this a broad stripe of the dark ground color, nearly as wide as the silvery white stripe. Silvery white stripe much narrower than is usual in *Crambus*, broadening slightly at about three-quarters and tapering gradually to a sharp point well basad of the submarginal line. There is sometimes a faint indication of a pale shade running from the tip of the stripe to the outer margin below the apex. The stripe has no dorsal tooth. Five indistinct, dull leaden, intervenular lines extending outward from near the stripe nearly to the submarginal line. Basad of the start of the submarginal line on costa is a very distinct diagonal white line, joining the narrow white costal edge. Submarginal line very gently curved below apex, running to inner margin, consisting of an inner, dark, and an outer, dull leaden, line. Apical area white, containing a narrow triangular patch of the ground color. Marginal area below it to inner margin powdery gray brown, with five long, slender, intervenular, black lines, each narrowly edged beneath with white. Fringes gray brown, shining, semi-metallic.

Length of fore-wing 12–15 mm., averaging 14.5 mm.

Hind-wing.—Gray brown, paler toward anal margin, the fringes whitish.

Head and Thorax.—Head and palpi gray brown, slightly lustrous. Thorax shining, brassy brown.

Male Genitalia.—Uncus no more than half as long as gnathos, slender, tubular, bearing only slender hairs. Gnathos very long, tapering, slender posteriorly. Tegumen narrow. Harpé

with costa relatively large and heavily sclerotized, terminating in a long, slender free lobe, which curves mesad and ends in a point. The free part of this lobe is between one-third and one-half of the total length of the costa. Cucullus lightly sclerotized, its terminal half curving strongly dorsad, tapering strongly to a rounded point. Sacculus broad and quite heavily sclerotized, with terminal, curved, pointed, mesad pointing spine. Vinculum broad, not notched, with prominent processes for articulation with the tegumen. Saccus relatively large, nearly as long or, in some specimens, as long as vinculum, thickest in its cephalic (distal) third. Aedeagus relatively very large and thick, nearly as long as harpé plus vinculum, blunt, little curved, with three large and very heavily sclerotized cornuti; these are broadly triangular with flat, disc-shaped bases.

TYPE MATERIAL.—*Crambus johnsoni* is described from a type-lot of six specimens. These are: holotype male, Panchuela Ranger Station, Cowles, N. Mex., 4 July, 1936 (Klots); allotype female, Redington, Ariz. (Barnes Coll.); four paratypes as follows:

New Mexico: two, Panchuela Ranger Station, Cowles, 4 July, 1936 (Klots).

Arizona: one, So. Arizona (Poling); one, McNary, White Mts., 10 July, 1936 (G. P. Engelhardt).

Holotype and allotype in The American Museum of Natural History; paratypes in the U. S. National Museum and the author's collection.

Crambus johnsoni is indubitably most closely related to *C. unistriatellus* Packard, as is shown by both the color and pattern and the genitalia. From *unistriatellus* it may be most easily separated as follows:

In the fore-wing of *unistriatellus* the silvery white discal stripe is relatively wider and more narrowly separated from the costa; the submarginal line is absent or at most only very faintly indicated; the discal stripe is followed by a white shade which extends to the outer margin so that in most specimens the stripe appears to run uninterruptedly to the margin; the submarginal space is not colored differently than the rest of the ground color; there are no, or but faint, traces of intervenular lines.

In the male genitalia of *unistriatellus* the uncus is relatively longer, nearly two-thirds as long as the gnathos; the free part of the costa is relatively shorter, no more than one-quarter the length of the whole costa, and is either truncate or broad and two-spined terminally; the cucullus is relatively more slender; and the spine of the sacculus is relatively longer; the saccus is relatively shorter and more slender; the cornuti are relatively much smaller and less sclerotized and their disc-shaped bases smaller.

It is very likely that *johnsoni* and *unistriatellus* have only comparatively recently diverged from a common ancestral stock to the point of specific differentiation. In this point it is extremely interesting to note that their geographic ranges do not even now appear to overlap and that they show every indication of having originated as geographic subspecies or "races."

Unistriatellus is very widespread, occurring typically as a Canadian Life Zone species from Quebec, New York and Pennsylvania across the continent to British Columbia and northern California. Its southern limit in the Rocky Mountain region appears to be in southern Colorado.

This new *Crambus* is dedicated to Ranger John W. Johnson of the U. S. Forest Service, of Pecos, New Mexico.

Crambus browerellus, new species

Figure 10

This species, characteristic of the Hudsonian Life Zone of both the Rocky Mountains and Maine, appears to exist in two distinct subspecies, both of which are here named.

Crambus browerellus browerellus

FORE-WING.—Ground color sooty brown. Wing crossed by two dark brown, irregular, jagged, distally bent lines, the first running from slightly beyond middle of costa to slightly before middle of inner margin, the second running from about three-quarters from base on costa to about three-quarters from base on inner margin. These lines sometimes rather obscure. Area basad of more basal line sometimes darker than rest of wing. Area between lines dorsad of cell sometimes, especially in female, paler than rest of wing. Six terminal, intervenular, dark brown dots; sometimes an indistinct, narrow, terminal line. Fringes lighter, grayish brown, with two indistinct, darker brown lines; fringes of female lighter than those of male.

Length of fore-wing 9–10.2 mm.

HIND-WING.—Ground color dull, grayish brown. Fringes as in fore-wing.

HEAD AND THORAX.—Palpi, head and dorsum of thorax grizzled, sooty brown.

MALE GENITALIA.—Uncus long, tapering, slightly flattened, bearing only slender hairs, ending in an abruptly down-bent point. Gnathos stout, flattened, shorter than uncus, abruptly narrowed just before tip and bent downward at tip. Tegumen broad, penicillus narrow. Costa of harpé very large, heavily sclerotized, with a dorsal swelling at about its middle, beyond that with a long free arm; this arm strongly narrowed and twisted at about its middle, beyond that swollen, terminating in a mesally bent, somewhat twisted tip. Cucullus of harpé long, slender, thickly haired, terminally bent mesad and dorsad. Sacculus of harpé heavily sclerotized, with a transverse connection near its tip to base of free lobe of costa. Vinculum narrow. Saccus short. Aedeagus long and stout, with a single, long, slender, pointed cornutus, at about two-thirds its length constricted and bent ventrad at the point where it articulates with the juxta. Juxta (anellus) broad ventrally, abruptly narrowing and thence slender to its articulation with aedeagus.

TYPE MATERIAL.—*Crambus b. browerellus* is described from a type-lot of ten specimens; these are: holotype male, Glen Cove, Pikes Peak, Colo., 12,000 ft. alt., 15 July, 1932 (Klots); allotype female, same locality, 12,500 ft. alt., 28 July, 1941 (Klots); six paratypes, as follows:

Colorado: three (two females, one male), Hall Valley, Park Co., 11,500–12,500 ft. alt., 13–15 July, 1935 (Klots).

Wyoming: one male, vicinity of Brooklyn L., Snowy Range, Albany Co., 8 July, 1929 (Klots); three males, one female, Univ. of Wyoming Camp, Snowy Range, Albany Co., 9,800–10,500 ft. alt., 17–23 July, 1935 (Klots). All specimens were taken in Hudsonian and lower Arctic-Alpine Life Zones, in short, grassy, "tundra" meadows.

Holotype, allotype and a paratype in The American Museum of Natural History. Paratypes in the collections of the U. S. National Museum, Cornell University and the author.

Crambus browerellus katahdini, new subspecies

Crambus browerellus also occurs on Mt. Katahdin, Maine; but the Maine specimens are quite distinctly different from those from the Rocky Mountains, being larger, lighter and brighter in color, so that it seems advisable to name them as a subspecies.

From the nymotypical subspecies, *katahdini* differs as follows:

The ground color of the wings is of a richer, more orange or yellowish brown, sometimes with an olivaceous tinge, as are also the dark transverse stripes of the fore-wing. In many of the males and in all of the females the ground color is considerably overlaid with light, brownish gray scales. These frequently form a distinct longitudinal shade along the dorsal half of the wing, especially along the veins. In some specimens this shade is almost white, is extended toward the costa between the transverse dark lines, and may reach the costa and form two small patches there, one just distad of each transverse line.

Fringes light gray, sometimes almost white, with a single dark line at about the middle. In the nymotypical subspecies there are characteristically two dark lines in the fringes.

TYPE MATERIAL.—*Crambus browerellus katahdini* is described from a type-lot of fifty-eight specimens. These are: holotype male and allotype female, Mt. Katahdin, Maine, 10 July, 1934, 4,636 ft. alt. (A. E. Brower); fifty-six paratypes, same locality, various dates, 30 June–14 July (Brower, Klots).

Holotype, allotype and a series of paratypes in The American Museum of Natural History. Paratypes in British Museum, Canadian National Collection, McGill University, Museum of Comparative Zoölogy, Cornell University, Academy of Natural Sciences of Philadelphia, U. S. National Museum, Kansas State College, Colorado State College of Agriculture, Southern California Academy of Sciences, Annette Braun, A. E. Brower, John L. Sperry and the author.

All specimens were taken on the Arctic-Alpine Zone "tundra" on the tableland of Mt. Katahdin, the majority in the vicinity of Governors Spring. The moths are easily flushed from the short sedges of the "tundra" and netted.

The only North American species with which *browerellus* could possibly be confused is *trichostomus* Christoph, which it strongly resembles in color and pattern. The genitalia of *trichostomus* are, however, absolutely different, having a short square-ended costa with no free lobe, a broad,

truncate cucullus, no recognizable sacculus, eight cornuti, two hooked spines at the tip of the aedeagus and no sclerotized juxta (anellus).

Crambus browerellus is named for Dr. Auburn E. Brower, my companion on many pleasant and fruitful collecting trips above "timberline."

Crambus abnaki, new species

Figure 11

Dr. McDunnough has very kindly sent me a series of a very distinct undescribed species of *Crambus* from southern Canada which, despite the rather chaotic condition of its group of the genus, warrants description at present.

FORE-WING.—Ground color grayish white, the basal two-thirds of the wing tinted with yellowish brown which is darkest on cell and along costa. Veins consistently lighter than the ground color. A scattered dusting of dark brown scales over all of wing except extreme terminal and apical areas, heaviest along inner marginal third. In some specimens traces of a curved submarginal line at about four-fifths from base. Fringes white, slightly mottled along dorsal half with light brownish.

Length of fore-wing 11–13 mm., averaging 12 mm.

HIND-WING.—Ground color grayish white, tinted with pale brownish in apical and terminal portions. In some specimens a more or less distinct, terminal brown line. Fringes white, very slightly dusted basally with very pale brownish.

HEAD AND THORAX.—Palpi yellowish brown, dusted with dark brown. Vertex, collar, dorsum of thorax and tegulae creamy white, the last slightly dusted with dark brown scales.

MALE GENITALIA.—Uncus long, somewhat flattened, broad and flat basally, tapering at about middle to an abruptly narrowed, downward hooked tip. Gnathos basally broad and flat, tapering gradually to a very thin tip. Tegumen broad, lightly sclerotized. Penicillus narrow. Costa with a heavily sclerotized, long, free, dorsal arm, which is evenly curved mesad, tapering to a sharp point and does not reach end of cucullus. Cucullus broad basally, tapering evenly to a narrow rounded point, its ventral and terminal half thickly haired inwardly. A short, sharp, recurved spine, broad basally, on inner face of harpé, which probably is a part of the sacculus. Sacculus heavily sclerotized, its ventral margin with a broad, rounded indentation near its termination. Vinculum broad, with an extra, slightly projecting, squarish ventro-cephalad flap. Saccus very small. Aedeagus longer than harpé plus vinculum, thick, somewhat produced cephalad of attachment of ductus seminalis, its terminal two-fifths curved ventrad and scobinate, rounded terminally, with a single, long, slender, pointed cornutus with an enlarged base. Juxta elongate, transverse, shield-shaped, with two arms that surround aedeagus at about two-fifths.

TYPE MATERIAL.—*Crambus abnaki* is described from a type-lot of ten specimens; these are: holotype male, Montreal, P. Q., 2 July, 1937 (L. Auger); allotype female, Montreal, P. Q., 10 July, 1930 (A. C. Sheppard); eight paratypes as follows:

Ontario: two females, Mer Bleue, 26 June, 1935 ("T.N.F.") and 25 June, 1937 (E. G. Lester); one female, Pt. Colborne, 10 June, 1933 (J. J. de Gryse).

Quebec: one male, Montreal, 10 July, 1928 (Sheppard); one male, St. Therese Isl., St. Johns Co., 22 June, 1911 (W. Chagnon); one female, St. Johns, 12 June, 1915 (W. Chagnon).

Nova Scotia: one female, Kings Co., 3 Aug., 1934.

New Brunswick: one female, Waweig, 21 June, 1938 (T. N. Freeman).

The holotype and allotype and a series of paratypes are in the Canadian National Collection, Ottawa. Paratypes are in The American Museum of Natural History, the U. S. National Museum and the collection of the author.

Color and pattern and genitalia show *abnaki* to be a member of the group of *Crambus* that includes *trisectus* Walker, *laciniellus* Grote, *dorsipunctellus* Kearfott and *edmontellus* McDunnough. From all of these it is easily differentiated by the very pale gray ground color of the terminal parts of the wing, the pale veins and the coarse, dark dusting on the dorsal part of the wing. It lacks the three white dashes at the outer margin and in the fringe of *trisectus*. It lacks distinct transverse markings, possessed characteristically by the above species. Genitalically it is very distinct. In *edmontellus* the vinculum is much more produced cephalad, and the small internal spine of the harpé is lacking. In *trisectus*, *laciniellus* and *dorsipunctellus* (the last two are probably only subspecifically distinct from each other) the cucullus narrows abruptly and caudad of the base of the free arm of the costa is very narrow

and tapers little; and the free arm of the costa is very long and heavy, reaching or exceeding the tip of the cucullus.

The Abnaki were a tribe of Algonquian stock that formerly occupied much of southeastern Canada.

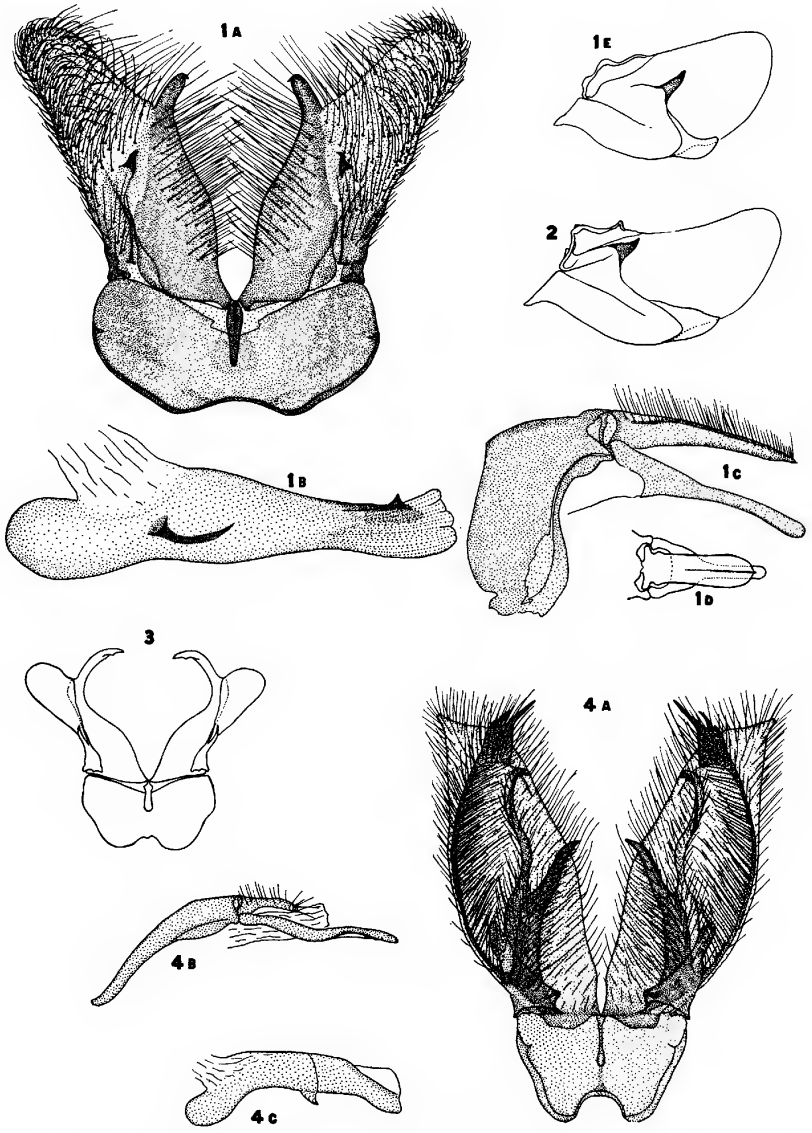

Fig. 1. *Crambus w. whitmerellus*, new species. A.—Dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart. B.—Lateral aspect, aedeagus. C.—Lateral aspect, tegumen, uncus and gnathos. D.—Dorsal aspect, uncus and gnathos, somewhat smaller scale E.—Left lateral aspect, vinculum and right harpé, somewhat smaller scale.

Fig. 2. *Crambus whitmerellus browni*, new subspecies, left lateral aspect, vinculum and right harpé, somewhat smaller scale.

Fig. 3. *Crambus dumetellus* Huebner (Europe), dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart, somewhat smaller scale.

Fig. 4. *Crambus watsonellus*, new species. A.—Dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart. B.—Lateral aspect, tegumen, uncus and gnathos. C.—Lateral aspect, aedeagus.

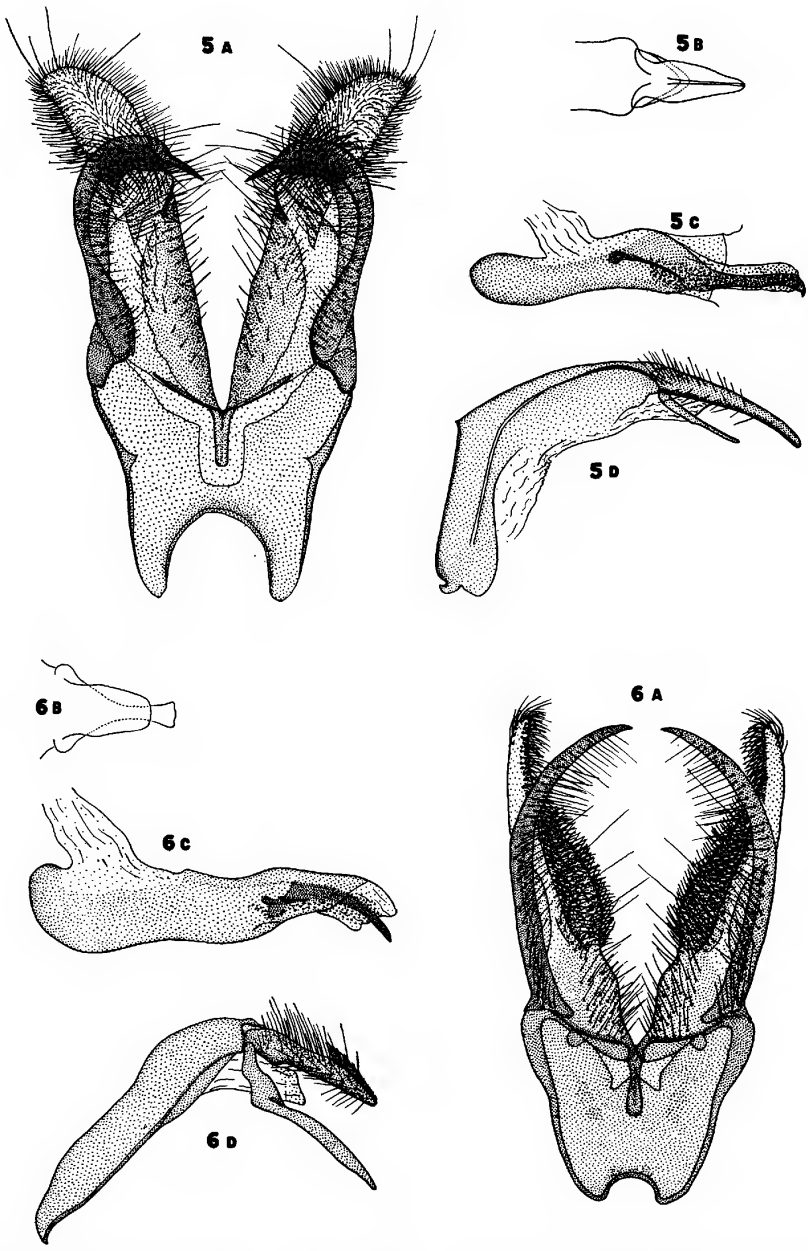

Fig. 5. *Crambus sargentellus*, new species. A.—Dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart. B.—Dorsal aspect, uncus and gnathos, somewhat smaller scale. C.—Lateral aspect, aedeagus. D.—Lateral aspect, tegumen, uncus and gnathos.

Fig. 6. *Crambus ainslieellus*, new species. A.—Dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart. B.—Dorsal aspect, uncus and gnathos, somewhat smaller scale. C.—Lateral aspect, aedeagus. D.—Lateral aspect, tegumen, uncus and gnathos.

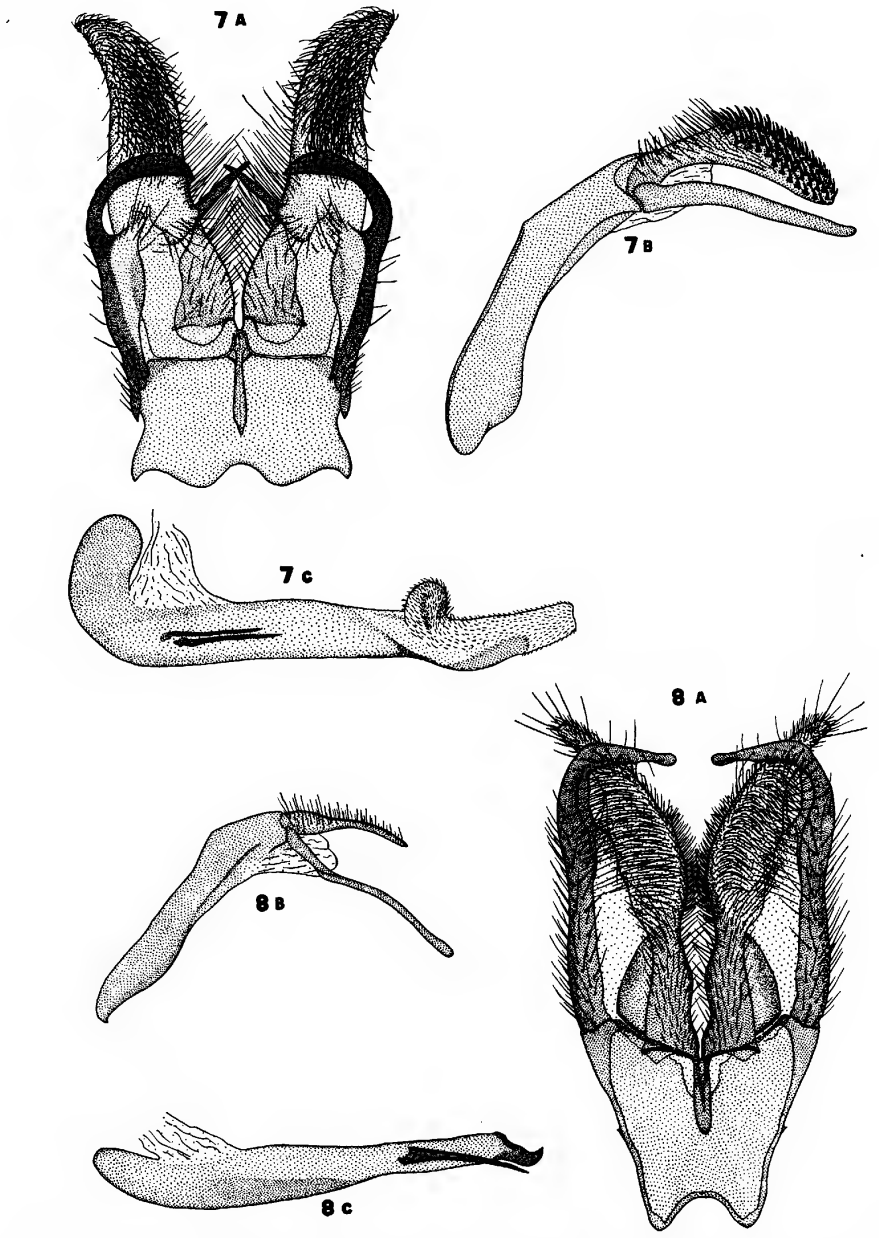

Fig. 7.—*Crambus cyrilellus*, new species. A.—Dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart. B.—Lateral aspect, tegumen, uncus and gnathos. C.—Lateral aspect, aedeagus.

Fig. 8. *Crambus sanfordellus*, new species. A.—Dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart. B.—Lateral aspect, tegumen, uncus and gnathos. C.—Lateral aspect, aedeagus.

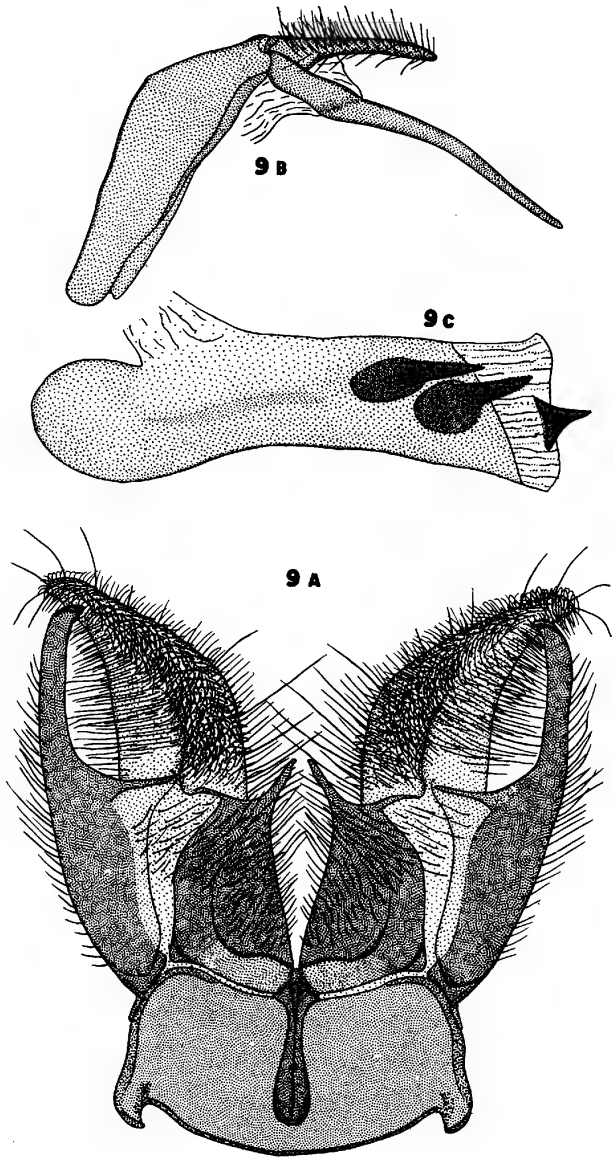

Fig. 9. *Crambus johnsoni*, new species. A.—Dorsal aspect, vinculum and harpés, the latter considerably abnormally spread apart. B.—Lateral aspect, tegumen, uncus and gnathos. C.—Lateral aspect, aedeagus.

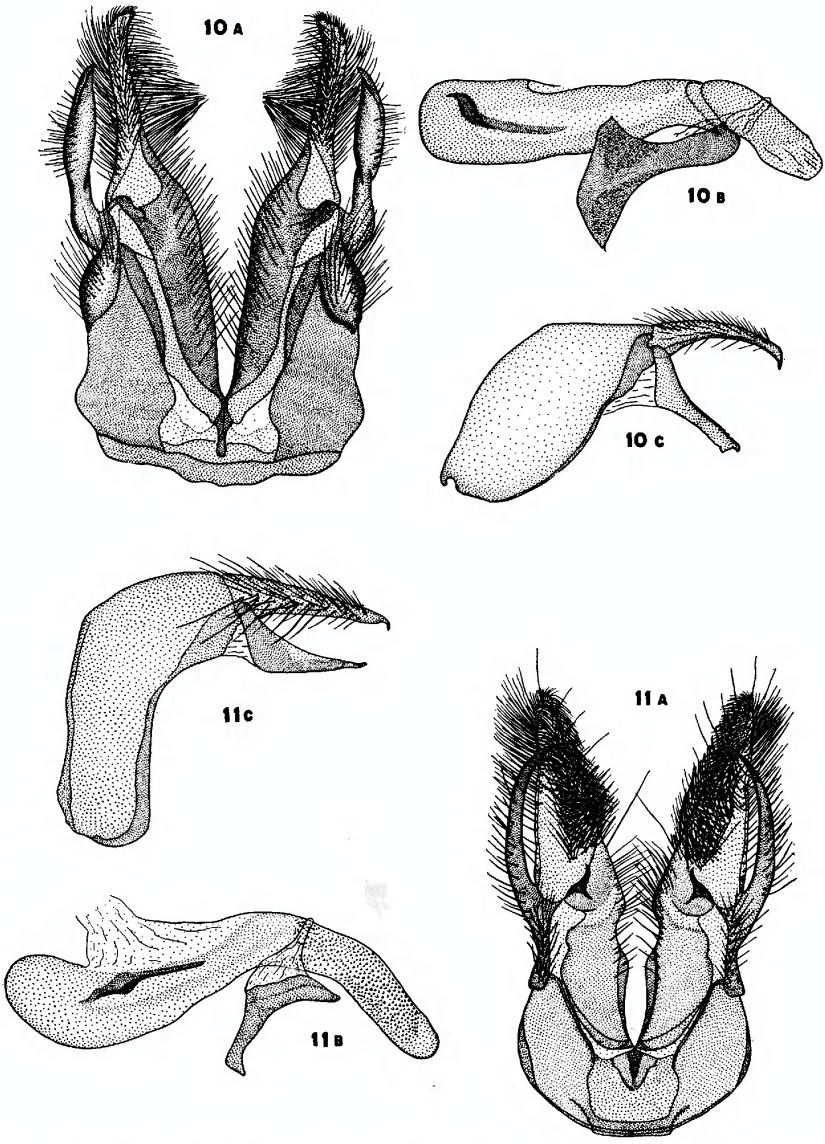

Fig. 10. *Crambus browerellus*, new species. A.—Dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart. B.—Lateral aspect, aedeagus. C.—Lateral aspect, tegumen, uncus and gnathos.

Fig. 11. *Crambus abnaki*, new species. A.—Dorsal aspect, vinculum and harpés, the latter somewhat abnormally spread apart. B.—Lateral aspect, aedeagus. C.—Lateral aspect, tegumen, uncus and gnathos.